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HARVEST MITES, OR "CHIGGERS."

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INTRODUCTION.

Residents of the South and of the more southern portions of many of the Central States, and especially visitors to these sections, are often subject to great annoyance due to the attacks of minute creatures popularly known as "chiggers"¹ and "red bugs," and incorrectly as ticks. These creatures occur in blackberry bushes, shrubbery, grass, and weeds, and persons walking or sitting down in such localities are liable to attack. "Chiggers" usually enter the skin near the shoe tops or at points below the knees, but sometimes they are jarred from bushes or small trees on to the neck and other exposed portions. Their habit of burrowing under the skin is not normal and brings about their death. Nevertheless the inflammation thus caused may become very painful, and where many of the creatures have attacked a person this may frequently lead to fever or other disagreeable consequences. The desire to scratch the affected spots is very strong, and scratching with the fingernails may easily abrade the skin and might communicate infec-

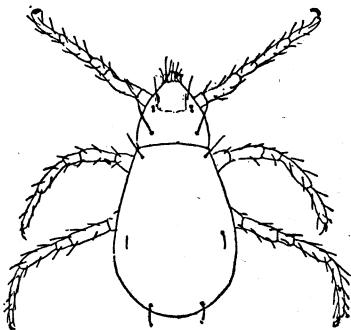


FIG. 1.—*Trombidium*: sp.: Larva, highly magnified. (From Banks.)

¹ The name "chigger" or "jigger" is evidently a corruption of chigoe, the pernicious sand flea (*Sarco-*psylla penetrans* L.*) of tropical America, a true flea, which crawls under the toe nails of man, producing painful sores which may result seriously if neglected.

NOTE.—This bulletin, which is a reprint, with revision, of Circular No. 77 of the Bureau of Entomology, U. S. Department of Agriculture, treats of the harvest mite and means for the protection and relief of human beings subject to its attack, together with methods of eradication. It will be of interest wherever this pest is troublesome.

tion from the nails or other outside sources. Children, and especially those who begin to go barefoot in grassy places in June to September, are great sufferers from this minute enemy.

WHAT "CHIGGERS" ARE.

These pests are the larval or six-legged forms of harvest mites of the genus *Trombidium*, the adults of which have eight legs. For present purposes we may consider the harvest mites as a class. In figures 1 and 2 illustrations of some common forms are furnished. The larval harvest mites are of microscopic size, blood red, and shaped somewhat like a common tick, being nearly as broad in front as behind. They belong to the order Acarina and are not true insects (Hexapoda), but are members of a distinct class (Arachnida) along with

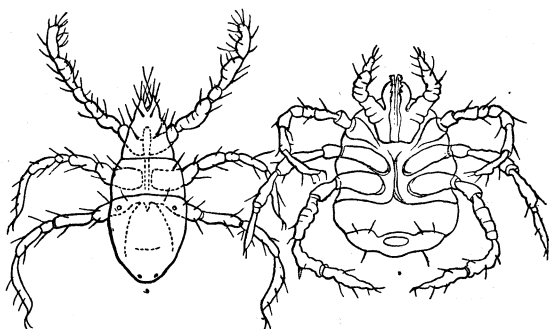


FIG. 2.—*Leptus americanus* at left; *Leptus irritans* at right. Highly magnified, dots under anal extremity indicating natural size. (After Riley.)

ticks, spiders, and the like. The parent mites are predaceous on true insects. As early as 1834 Mr. A. L. Dugès¹ made observations on these mites, which, as previously stated, have six legs in the immature or parasitic stage, while the adults have eight. The adults are of different shades of red and are

quite visible. Many persons are familiar with the appearance of the young of certain species, as they occur on the under surface of the bodies of grasshoppers and harvest spiders or "daddy-long-legs" (Phalangiidae) and under the wings of the house fly. Just what species of harvest mites are troublesome to man in the United States is not known, but one of them, perhaps the commonest, is referred to in literature as "*Leptus*" *irritans* Riley.²

SYMPTOMS AND MANNER OF ATTACK.

Soon after the harvest mite burrows under the human skin a small red spot appears (evidently the mite itself gorged with human blood),

¹ Dugès, Ant. Recherches sur l'ordre des Acariens en general et la famille des Trombididés en particulier. In Ann. Sci. Nat. Zool., t. 1, ser. 2, art. 1, p. 36, 1834; see also Megnin, P., Memoire sur les Metamorphoses des Acariens en general et en particulier sur celles des Trombidions. L. c., t. 4, sér. 6, art. 5, p. 1-20. 1876; and Murray, Andrew, Economic Entomology, Aptera, p. 129-133, London, 1877.

² Riley, C. V. Poisonous insects, p. 745, fig. 2980, New York. 1887. (Extracted from Reference Handbook of the Medical Sciences, v. 5.)

Leptus is a genus founded on the larval *Trombidium*. Those who may desire further information in regard to the structure of the adult may consult Banks, Nathan: "A treatise on the Acarina, or mites." (In Proc. U. S. Nat. Mus., v. 28, p. 30, 31, 1904.)

after which the surrounding surface becomes congested, the affected area spreading until it is from less than a fourth to a half or three-fourths of an inch in diameter. This congestion may manifest itself within less than an hour after exposure or may not be apparent for 12 hours or so, the fever being at its height usually on the second day. The symptoms are apt to be first noticed when the sufferer has removed his clothing at night, or upon awakening from sleep. It sometimes happens that there is little irritation until some time after exposure, but with most persons susceptible to the poisonous effects of these mites irritation is first experienced on the second day. The feverish appearance of the afflicted skin area varies according to the susceptibility of the person attacked. Children dwelling or sojourning in mite-infested localities suffer greatly from these pests, experiencing more severe annoyance than adults, and young women as a rule suffer more than older persons. People with thin, delicate skin and florid complexion are most afflicted by the mites, and with them the congested red spots are proportionately larger and more inflamed and irritating.

Many persons, however, as, for example, permanent residents of infested regions, and particularly farm laborers, seem to be practically proof against the toxic effects of harvest mites and go with impunity into places overrun with them. This immunity to poisoning is obviously due to two causes: (1) To outdoor work which toughens the person's skin, especially such portions of the arms and legs as are much exposed to the sun and weather; and (2) to inoculations, due to frequent infection.

The inflamed spots due to the presence of the mites under the human cuticle are often diagnosed as hives, nettle rash, urticaria, or the "wheals," and resemble closely those produced on many persons by the "bites" of fleas and some mosquitoes, but on the second or third day each of the mite-infested areas is usually found surmounted at the middle by a minute vesicle or water blister. This is obviously the most important characteristic of harvest-mite attack. After the subsiding of the inflammation and itching, which takes place in a few days, a small scale or scab frequently forms, leaving on some persons a scar which does not wholly disappear in extreme cases for weeks. The mites naturally attack first those portions of the body which are most exposed—those nearest the ground. They crawl into the

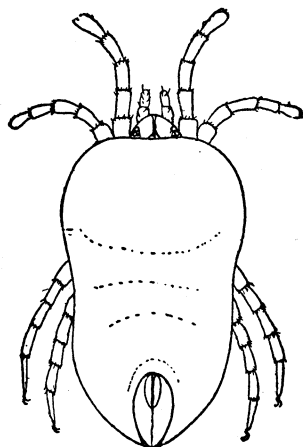


FIG. 3.—*Trombidium* sp.: Adult, highly magnified. (From Banks.)

stockings and penetrate the skin about the ankles, frequently below the shoe tops, and are usually found most numerous below the knee. According to the late Dr. John Hamilton, a physician as well as entomologist, the harvest mites enter the larger sweat tubes or pores of the skin, and as these tubes are very tortuous, the progress of the mites is necessarily slow, from 18 to 36 hours being required for them to reach the end. When the lesions caused by these mites are unusually numerous, the sufferer becomes feverish, and sleep is much disturbed. Sometimes the afflicted one becomes frantic and lacerates his flesh by too vigorous and frequent scratching. Erysipelas is known to follow severe attacks, and death resulting from blood poisoning is recorded. These more serious results of infestation are, however, exceptional and, as with the fatalities which in rare cases follow the ordinarily merely painful or annoying "bites" of many insects, undoubtedly point to an impurity of the blood.

HABITAT.

Harvest mites are most abundant in damp locations, along the borders of streams and other bodies of water, and on the edges of forest and woodland. They occur also on trees and shrubbery, evidently infesting the lower surface of the leaves, from which they drop off when these are rudely shaken, and find lodgment on the neck or other exposed parts of the body. Riley describes "*Leptus americanus*" as affecting chiefly the scalp and armpits. In places infested by harvest mites it is a matter of danger to sit down or lie in the grass and herbage for any length of time, as the mites will then have easy access to almost any portion of the body. As a rule these creatures appear to be dependent on the shade and not to live in the direct sunlight, but some forms occur in sunny locations.

These mites are most abundant and troublesome in the Tropics, and become less numerous as we go northward. They are generally distributed in the Gulf States, up the Mississippi River to Missouri and Illinois, and through the Atlantic Coast States to northern New Jersey. They appear to be unknown in New York and New England, or north of latitude 40° in the East.

Trouble from chiggers has also been reported in portions of Tennessee and practically throughout the State of Ohio, because we have record of injury as far north as Sandusky, which is on Lake Erie, Lima, in the northern part of the State, Cincinnati, and Columbus. Reports that these creatures have also been found in other localities may and may not be true at the same time, since with the cultivation of the soil and the destruction of wild bushes and other places of harbor they have practically disappeared. There are reports also of the occurrence of chiggers at Horicon, Wis., and La Fayette, Ind., in Minnesota, and at Belvidere, S. Dak.

Several reports have been received of a plague of these mites in the vicinity of Chicago, Ill., showing similar distribution in that State. Chiggers are well distributed in Kansas, and reports would indicate similar conditions in Indiana and portions of Iowa.

Harvest mites are well known in England and Scotland under this name and as "gooseberry bugs." On the Continent of Europe, also, they are abundant, especially in Belgium and the Netherlands, in parts of Germany, and in France. Indeed, in some of these countries they have at times caused considerable annoyance to the peasantry, whom they have hindered or prevented in the harvesting of certain crops. The mites are troublesome, too, in tropical America, in the West Indies, and in Japan.

LIFE HISTORY.

The life history of a harvest mite, as related by Mr. Nathan Banks, is substantially as follows: The female lays her eggs in or upon the ground, sometimes to the number of 400 in one place. The eggs are usually brown and spherical and have been considered by some early writers as fungi. The chorion or outer skin splits soon after the eggs are deposited, dividing the eggs into halves and exposing the pale vitelline membrane. The larva when hatched is circular or ovoid in outline, and each of its three pairs of legs is tipped with two or three prominent claws. After the larva has become attached to its insect host it elongates and becomes swollen with food. When full fed it drops off, seeks a convenient shelter, and gradually changes in shape without molting. The new parts are formed under the larval skin, which after a few weeks cracks and discloses the adult *Trombidium*. The mature harvest mite is predaceous, wandering about and feeding on aphides, small caterpillars, and, in the case of one species, on the eggs of grasshoppers or locusts. It hibernates in the soil or in other sheltered locations and in the spring deposits its eggs. There appears to be a single generation produced each year. Only a few forms have been reared. The larva of one occurs commonly on the house fly in autumn.

REMEDIES.

As harvest-mite infestation is usually contracted by walking or working among blackberry and other shrubbery which harbors them, or by walking, sitting, or lying among grasses or similar herbage along streams or pools, on the edges of marshes, or under trees near such places, it is obvious that the best means of prevention is the avoidance of exposure by susceptible persons. If, however, a bath is taken in hot water, or water containing salt or strong soap, within a few hours after exposure, no ill effects will be experienced. After a longer exposure a bath has practically no effect, and direct remedies are necessary.

Sulphur is a sovereign remedy for mites and is the best preventive of attack. When exposure is unavoidable and where vegetation is not more than 2 or 3 feet high, a sure preventive is found in sifting flowers of sulphur into the underclothes from a little above the knee downward and into the shoes and stockings, or it may be rubbed over legs and ankles. Naphthalene has been successfully used in the same manner. While the sulphur, being inodorous and perfectly effective, is undoubtedly preferable against harvest mites alone, naphthalene is a safeguard against various forms of man-infesting tropical insect pests. Vaseline, pure or mixed with sulphur, will serve the same purpose, but is not so agreeable on account of its oily nature and the certainty of its soiling the clothing.

For most localities these precautions are to be observed through the months of July, August, and a part of September. The mites are seldom bothersome in early June or as late as October, but in exceptionally warm seasons they are apt to be encountered in both months.

If exposure has been unwittingly incurred or precautions have been neglected and the characteristic irritation has set in, warning the patient of trouble to come, a counter-irritant or cooling lotion should be applied directly to the affected parts. For this purpose moderately strong ammonia, applied when the symptoms are first manifest, has offered the best results, and the writer recommends it above all other direct remedies. Bicarbonate of soda, or common cooking soda or saleratus, may be substituted in supersaturated solution. Similar alkaline solutions would probably also serve in counteracting the insect poison, which is acid. These substances should be applied liberally until the irritation subsides. Some persons have testified to the value of a 10 per cent dilution of carbolic acid. Alcohol, camphor, essence of peppermint, and similar preparations are very "cooling," but afford, as a rule, only temporary relief. A dilute tincture of iodine or collodion applied lightly to the affected parts is a good remedy in case of severe suffering. The latter acts by protecting the "sore" spots from the air.

DESTRUCTION OF THE MITES IN THE FIELD.

Much complaint has been made of the presence of harvest mites on lawns and in vegetation in country grounds and along pathways and roadsides, and information has been solicited by many, including officers of country clubs and the like, for methods of eliminating the mites from such locations. This can be accomplished by keeping the grass, weeds, and useless herbage mowed as closely as feasible, so as to expose the mites to the sun. In some cases this can be facilitated by dusting the grass and other plants, after cutting, with flowers of sulphur or by spraying with dilute kerosene emulsion in

which sulphur has been mixed. Grasses on the borders of ponds frequented by cattle, wild blackberry bushes, and similar plants should also be cut down and destroyed in the vicinity of houses and where children and older persons are liable to mite infestation by passing through them. Well-cultivated fields kept free from weeds are not infested with "chiggers," and in the course of time, perhaps a year or two, the measures prescribed, if carefully carried out in grassy locations, should also entirely free these from the pests.

In severely chigger-infested tracts of, say, 400 acres, where there are no bushes or shrubs of value, cattle may be inadequate, and correspondents and others have stated as their experience that after turning sheep into the fields the chiggers were destroyed. Undoubtedly this was due largely to the fact that the sheep kept the grass more closely cropped than cattle would have done, but there is also a belief that the chiggers ascend the legs of the sheep and that the oil or lanoline of the wool is responsible for their death. Hence it is believed that sheep turned into large tracts such as described would accomplish the eradication of the mites more thoroughly and in a shorter space of time than would perhaps any other domestic animal, even including goats, which might be used in some cases.

For the eradication of chiggers on the grounds of wealthy private individuals and clubs the application of ordinary flowers of sulphur might be both cheaply and thoroughly made by the use of one of the dust blowers used for dusting potatoes with Paris green, or by one of the sulphur dusters used for spraying orange trees for the red spider in California. These sprayers are capable of throwing a fan-shaped discharge about 8 feet wide and effect very even and thorough distribution. The cost of application, allowing 50 pounds of sulphur per acre, should be from \$1 to \$1.50 per acre, and since with one man and a team 30 to 40 acres a day may be covered, the expense of application is not great. Such a duster costs from \$65 to \$80.

